**Problem analysis**

**Problem specification**

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| **Client:** | * The coordinator of the Department of Transformation and Improvement from Universidad Icesi. |
| **Users:** | * Employees from the department of Transformation and Improvement in Universidad Icesi. * Representants of every other department inside Universidad Icesi. |
| **Functional requirements:** | * Req#1: Register a collaborator from Universidad Icesi * Req#2: Register a department from Universidad Icesi. * Req#3: Register a project request. * Req#4: Change the status of a request. * Req#5: Create a Knowledge Management project. * Req#6: Create a Transformation/Improvement project. * Req#7: Close a project. * Req#8: Display the information of the last 5 projects (based on query date) of each team member in matrix form. * Req#9: Access the detailed information of a project. * Req#10: Review the efficiency of a collaborator from the Department of Transformation and Improvement in a given month * Req#11: Review the efficiency of a determined project. * Req#12: Review the efficiency of a request. * Req#13: Consult the number of projects by type and priority. * Req#14: Consult the number of projects led by every collaborator in the Department of Transformation and Improvement. * Req#15: Consult the number of received requests and managed in a given month. * Req#16: Generate test objects. |
| **Context of the problem:** | * Universidad Icesi has an appointed Department of Transformation and Improvement which focuses on receiving requests for institutional projects or creating new projects, advising, managing all the appropriate information so the university can improve in an orderly and standardized fashion. Currently the Department faces a problem regarding its organization and management of requests and projects, so it looks for a program that relieves this stress. * The coordinator of the Department of Transformation and Improvement wants his employees (and the rest of collaborators in the university) to utilize the program to manage all the information regarding requests, projects, and statistics. A collaborator should be able do register a request and a worker from the Department should be able to change the status request, make a project, close the project, and some other functionalities. The program should also allow the users to check efficiency indicators regarding requests, projects or collaborators enrolled inside the Department of Transformation and Improvement. * The program should work with a simple menu that multiple users can easily understand and utilize properly. It must be able to handle a big amount of information but maintain a high level of organization and coherence. |
| **Nonfunctional requirements:** | * Interoperability: The program should be able to handle multiple users at a time. * High usability: The program should use a menu that makes it easy to understand while entering, editing, or consulting information. * High availability: The program should be working 24/7 and outage risks mitigated. |

**Requirement specifications**

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| **Identifier and Name:** | Req#1: Register a collaborator from Universidad Icesi. | | |
| **Summary:** | The system will allow the user to register a new collaborator by taking the mandatory (ID, full name, etc.) and optional information (extension number) to create the appropriate instance of a collaborator. To create the collaborator, it must be specified if it is either a general collaborator or a specific one from the Department of Transformation and Improvement. Afterwards, the system will check if the entered collaborator was already registered before and display a “duplicate” message in case it happens. If any other error were to occur, the system will display an invalid information, incomplete information or a general error message. | | |
| **Inputs** | **Input name** | **Data Type** | **Conditions for valid values** |
| Collaborator Type | int | * The user must select one of the following options:   1. General Collaborator   2. Transformation and Improvement Collaborator * Mandatory |
| ID | String | * Mandatory |
|  | Full Name | String | * Mandatory |
|  | Institutional email | String | * Mandatory |
|  | Extension number | String | * Optional |
| **Results or postcondition** | A new collaborator is registered with all the mandatory information (adding the extension number if it is filled) and a success message is printed. If a collaborator with the same ID was already registered, a “no duplicate” message will be printed. If there any other error occurs within the process because of incomplete information, invalid information or any other general error, the appropriate error message will be displayed. | | |
| **Outputs** | **Output Name** | **Data type** | **Format** |
| Successful registration | String | A message stating that the collaborator was successfully registered, stating which type was just registered. |
| Duplicate collaborator | String | A message displaying that a collaborator with the entered ID has already been registered. |
| Error | String | A message stating there was an error of unknown cause that didn't allow the function to work correctly will be printed. |
| Incomplete information | String | A message stating that not all the mandatory fields where filled will be printed. |
| Invalid information | String | A message stating that there are mistakes in the inputted information (don’t follow the conditions). |

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| **Identifier and Name:** | Req#2: Register a department from Universidad Icesi | | |
| **Summary:** | The system facilitates the registration of a new department by allowing users to input essential details such as the department's name, address, internal code, and select a responsible collaborator from a menu displaying registered collaborators. In case there are no preregistered collaborators to select from the list an “at least one collaborator” message will be printed. Upon submission, the program checks to ensure the department being registered doesn't already exist in the system. If a duplicate entry is detected, a clear "duplicate" message is promptly displayed, alerting the user to the existing registration. If any provided information is deemed invalid or incorrect, the user is notified with an appropriate error message. Additionally, should any unforeseen errors occur during the registration process a general error message is presented to the user. Finally, upon successful registration without encountering any errors, the system confirms the successful addition of the new department. | | |
| **Inputs** | **Input name** | **Data Type** | **Conditions for valid values** |
| Address | String | * Mandatory |
|  | Responsible Collaborator | int | * The user must enter one of the numbers that is displayed representing one of the names and ids of the preregistered collaborators. * Mandatory |
|  | Department’s name | String | * Mandatory |
|  | Internal Code | String | * Mandatory |
| **Results or postcondition** | The system allows you to register a new department using the name, address, internal code, and a responsible collaborator. Before letting the user enter the entire information, it will check that there is at least one collaborator to associate to the department. If there are no collaborators preregistered an “at least one collaborator” message will be printed. Then the system will ask for the code to check for any duplicates, and if there is another department with the same internal code, a “duplicate” message will be printed instead. On the other hand, if both filters are passed, the user will be able to enter the rest of the information of the department. The responsible collaborator should be selected from a menu displaying the names of the registered collaborators. If any other additional errors occur an invalid, incorrect information or general error message will be printed. | | |
| **Outputs** | **Output Name** | **Data type** | **Format** |
| Successful Registration | String | A message stating that the department was registered successfully will be printed. |
| At least one collaborator | String | A message stating that to register a department there must be at least one collaborator preregistered. |
| Duplicate Department | String | A message stating that the department with the entered internal code had already been registered will be printed. |
| Error | String | A message stating there was an error of unknown cause that didn't allow the function to work correctly will be printed. |
| Incomplete information | String | A message stating that not all the mandatory fields where filled will be printed. |
| Invalid information | String | A message stating that there are mistakes in the inputted information (don’t follow the conditions) |

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| **Identifier and Name:** | Req#3: Register a project request | | |
| **Summary:** | The program enables a user to initiate a new request by providing the subject, description, selecting a responsible collaborator and department from two separate menus. If there are no preregistered collaborators, an “at least one collaborator” message will be shown. If there is not at least one preregistered department, an “at least one department” message will be printed instead. It then checks for any existing requests with the same subject in the department’s projects to prevent duplicates, showing a message if found. Upon successful validation, registration date matching the time of the request and automatically makes its status “pending”. If there are any errors or missing information, it prompts a message detailing the issue. In case of any other errors, it shows a general error message. | | |
| **Inputs** | **Input name** | **Data Type** | **Conditions for valid values** |
| Subject | String | * Mandatory |
|  | Description | String | * Mandatory |
|  | Collaborator’s Name | Int | * The user must enter one of the numbers that is displayed representing one of the names and ids of the preregistered collaborators. * Mandatory |
|  | Responsible Department | int | * The user must enter one of the numbers that is displayed representing one of the names and internal codes of the preregistered departments. * Mandatory |
| **Results or postcondition** | The program will register a new request done by a collaborator taking the subject, description, the collaborator, and department (selected from two small menus displaying the names and ids of the preregistered collaborators and departments). If there is not at least one collaborator an “at least one collaborator” message will be shown. Likewise, if there isn’t at least one preregistered department an “at least one department” message will be printed. Afterwards, the subject will be used to check if there is any other request with the same topic inside the projects done by that collaborator. If both filters are passed, the new request will be created with a date of registration (which will be the one the system provides at the time of registration) and it sets its status to “pending”. If there any other errors that have to do with invalid or incomplete information or any other general error, the system will display an appropriate message. | | |
| **Outputs** | **Output Name** | **Data type** | **Format** |
| Successful registration | String | A message stating that the request was registered successfully will be printed along with the unique ID. |
| At least one collaborator | String | A message stating that there should be at least one collaborator in order to assign a responsible collaborator to a request will be shown. |
| At least one department | String | A message stating that there should be at least one department in order to assign a responsible area to a request will be shown. |
| Duplicate request | String | A message showing that that a request with that subject had already been registered previously by that collaborator will pop up. |
| Error | String | A message stating there was an error of unknown cause that didn't allow the function to work correctly will be printed. |
| Incomplete information | String | A message stating that not all the mandatory fields where filled will be printed. |
| Invalid information | String | A message stating that there are mistakes in the inputted information (don’t follow the conditions) |

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| **Identifier and Name:** | Req#4: Change the status of a request. | | |
| **Summary:** | The system allows the user to change the status of a selected pending request. If there are no registered departments, the system will print an “at least one department” message. If no preregistered pending requests, it displays an “at least one pending request” message. If there is not at least one DTI collaborator registered, the system will show a message stating that there must be one in case a request is approved. After both filters are passed, then all the departments with pending requests will be printed. After the user selects one, it will then show a menu with a list of the pending requests saved within the department. Next, another menu listing the possible status types that the user could select will be shown. Finally, the system will proceed to change the status of the selected pending request within the department and show an ”success” message. After the status change, a message confirms the successful update and saves the date of classification. If the user changes the request’s status to “approved” then it will force the user to create a project (check **Req#5** and **Req#6**). If there's an error due to invalid or incomplete info, or any other issue, the system shows the appropriate message. | | |
| **Inputs** | **Input name** | **Data Type** | **Conditions for valid values** |
| Department | Int | * The user must enter one of the numbers that is displayed representing one of the preregistered departments. * Mandatory |
| Request Subject | int | * The user must enter one of the numbers that is displayed representing one subject of a request. * Mandatory |
|  | Status change | int | * A number from the following options must be selected:   1. Approved   2. Denied   3. Pending * Mandatory |
| **Results or postcondition** | The system will display the name and internal code of the registered departments with pending requests. Then the user will have to choose from one of the printed menus holding the pending requests (Subject) within that department. Finally, the user will have to select one of the displayed options (Approved, denied or pending). At the end, a message displaying that the status of a request has been changed successfully and it will save the date of assignation. If the pending request is approved, then the user must register one of the types of projects (explained further one). If there are no registered departments, an “at least one department” message will be printed. If there were no preregistered pending request an “at least one pending request” message will be shown. If there is not one DTI collaborator registered before entering this function, the system will show a message stating that there must be one in case a request is approved. If an error related to invalid or incomplete information or any other general error the appropriate message will appear depending on the case. | | |
| **Outputs** | **Output Name** | **Data type** | **Format** |
| Successfully changed the status | String | A message stating that the status from the request was changed successfully will be printed. |
| At least one department | String | A message indicating there must be at least one department registered before changing the status of a request will be printed. |
| At least one pending request | String | A message saying that there should be at least one existing pending request will be shown. |
| At least one DTI collaborator | String | A message warning that there must be a preregistered DTI collaborator in case a pending request is approved. |
| Error | String | A message stating there was an error of unknown cause that didn't allow the function to work correctly will be printed. |
| Incomplete information | String | A message stating that not all the mandatory fields where filled will be printed. |
| Invalid information | String | A message stating that there are mistakes in the inputted information (don’t follow the conditions) |

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| **Identifier and Name:** | Req#5: Create a Knowledge Management project. | | |
| **Summary:** | After a request has been accepted, then the system enables the user to input a new knowledge management project along with mandatory details, including the name, priority level, project leader, impacted community, and project type. Menus are presented for selecting a project leader (from preexisting collaborators), impacted community, and project type. In case of a duplicate project name, a "duplicate" message is displayed. Upon successful validation, the system generates a four-character unique project ID, a registration date, and an estimated closure date. Any errors related to incomplete or invalid information prompt appropriate error messages. | | |
| **Inputs** | **Input name** | **Data Type** | **Conditions for valid values** |
|  | Priority | int | * The user must select one of the following numbers representing a priority level:   1. High   2. Medium   3. Low   4. Urgent * Mandatory |
|  | Project leader | int | * The user must enter one of the numbers that is displayed representing the ID and full name of an employee from the Department of Transformation and Improvement. * Mandatory |
|  | Project Name | String | * Mandatory |
|  | Impacted community | String | * One of the following options must be selected:   1. Students   2. Professors   3. Administrative * Mandatory |
|  | Type | int | * One of the following options must be selected:   1. Standardization   2. Documentation   3. Optimization * Mandatory |
| **Results or postcondition** | After a request has been accepted, the system will allow the user to create a new knowledge management project using all the mandatory information including the name, a priority level, project leader, an impacted community, and a type of project. A menu will be printed to select a project leader (from the preexisting collaborators from the DTI), the impacted community and the type of project. If the entered name for the project already exists a “duplicate” message will be printed. If all the filters are passed, the system will create a unique ID for the project, a registration date (the same day the registration happened), and an estimated date of closure (Urgent = 5 days, high = 10 days, medium = 30 days, low = 60 days). For other general errors, incomplete information or invalid information, the appropriate error messages will be printed. | | |
| **Outputs** | **Output Name** | **Data type** | **Format** |
| Created knowledge management project | String | A message stating that the knowledge management project was registered successfully will be printed. |
| Duplicate project | String | A message stating that a project with that name already exists will be printed. |
| Error | String | A message stating there was an error of unknown cause that didn't allow the function to work correctly will be printed. |
| Incomplete information | String | A message stating that not all the mandatory fields where filled will be printed. |
| Invalid information | String | A message stating that there are mistakes in the inputted information (don’t follow the conditions) |

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| **Identifier and Name:** | Req#6: Create a Transformation/Improvement project | | |
| **Summary:** | After a request has been accepted, the system lets users input a new Transformation/Improvement project, needing details like the name of the project, priority level, project leader, and process code. Menus help a project leader. If the project name already exists, it warns about duplicates. After validation, the system creates a unique project ID, registration date (same as entry), and estimated closure date (Urgent = 5 days, High = 10 days, Medium = 30 days, Low = 60 days). Errors or missing info trigger appropriate messages. | | |
| **Inputs** | **Input name** | **Data Type** | **Conditions for valid values** |
| Accepted request | int | * The user must enter one of the numbers that is displayed representing one of the ID and the subject of an accepted request. * Mandatory |
|  | Priority | int | * The user must select one of the following numbers representing a priority level:   1. High   2. Medium   3. Low   4. Urgent * Mandatory |
|  | Project leader | int | * The user must enter one of the numbers that is displayed representing the ID and full name of an employee from the Department of Transformation and Improvement. * Mandatory |
|  | Project Name | String | * Mandatory |
|  | Process Code | String | * Mandatory |
| **Results or postcondition** | After the system accepts a request, it will allow the user to enter a new Transformation/Improvement project using all the mandatory information including the name of the associated accepted request, a priority level, project leader, and the process code. A menu will be printed to select an accepted request and a project leader (from the preexisting collaborators from the DTI). If the entered name for the project already exists a “duplicate” message will be printed. If all the filters are passed, the system will create a unique four-character ID for the project, a registration date (the same day the registration happened), and an estimated date of closure (Urgent = 5 days, high = 10 days, medium = 30 days, low = 60 days). For other general errors, incomplete information or invalid information, the appropriate error messages will be printed. | | |
| **Outputs** | **Output Name** | **Data type** | **Format** |
| Created Transformation/Improvement project | String | A message stating that the Transformation/Improvement project was registered successfully will be printed. |
| Duplicate project | String | A message stating that a project with that name already exists will be printed. |
| Error | String | A message stating there was an error of unknown cause that didn't allow the function to work correctly will be printed. |
| Incomplete information | String | A message stating that not all the mandatory fields where filled will be printed. |
| Invalid information | String | A message stating that there are mistakes in the inputted information (don’t follow the conditions) |

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| **Identifier and Name:** | Req#7: Close a project | | |
| **Summary:** | The system allows the user to close a project by selecting it from a menu that displays all the registered projects. If there are no registered unclosed projects, the system will prompt that there must be at least one project in order to close one. After the project is selected, the user must enter the date on which the project was or will be closed; this date must be a later date compared to the date of registration or a “earlier closing date” message will be printed. If there is any error in the format or the information is incomplete an invalid or incomplete information message will appear. Any other error will be shown as a general error. | | |
| **Inputs** | **Input name** | **Data Type** | **Conditions for valid values** |
| Project | int | * The user must enter one of the numbers that is displayed representing one of the ID and the name of a project. * Mandatory |
|  | Closing Date | Calendar | * Dd-mm-yyyy * Must be a date later than the registration date. * Mandatory |
| **Results or postcondition** | The system allows the user to close a project by selecting it from a menu that displays all the registered projects. If there are no registered unclosed projects, the system will prompt that there must be at least one project in order to close one. After the project is selected, the user must enter the date on which the project was or will be closed; this date must be a later date compared to the date of registration or a “earlier closing date” message will be printed. If there is any error in the format or the information is incomplete an invalid or incomplete information message will appear. Any other error will be shown as a general error. | | |
| **Outputs** | **Output Name** | **Data type** | **Format** |
| Closed project | String | A message stating that the project was closed successfully will be printed. |
| At least one unclosed project | String | The system will print a message stating that there needs to be at least one unclosed project so he can close one. |
| Earlier closing date | String | A massage stating that the closing date entered is an earlier date than the registration date will be printed. |
| Error | String | A message stating there was an error of unknown cause that didn't allow the function to work correctly will be printed. |
| Incomplete information | String | A message stating that not all the mandatory fields where filled will be printed. |
| Invalid information | String | A message stating that there are mistakes in the inputted information (don’t follow the conditions) |

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| **Identifier and Name:** | Req#8: Display the information of the last 5 projects (based on query date) of each team member in matrix form. | | |
| **Summary:** | The system provides users with an option to display all necessary information for the last 5 projects allocated to each team member in matrix form via a menu. If the entered query date lacks at least one project for one of the collaborators in DIT with a posterior date, an "empty date" message appears. The matrix includes collaborator names, project IDs, priorities, and estimated deadlines, with project lists per collaborator ordered by closeness to the query date and priority. If a collaborator has less than 5 projects registered posterior to the query date, the matrix will still print the spaces for those projects making it explicit they aren’t any left. If no preregistered projects exist before selecting this option, an "at least one project" message is displayed. Any other errors prompt a general error message. | | |
| **Inputs** | **Input name** | **Data Type** | **Conditions for valid values** |
| Consultation date | Calendar | * Dd-mm-yyyy * The users are required to input the date that will determine the projects to be displayed. * Mandatory |
| **Results or postcondition** | The user will be able to select from the menu the option to display all the needed information of the last 5 projects (based on query date) allocated to each team member in matrix form. If there is not at least one created project, an “at least one project” message will be shown. If the entered query date doesn’t have at least 1 project for one collaborator in the DIT with posterior date, a “empty date” message will be printed. The included information in the matrix must be the collaborator, the ID of the project, the priority (shown as a single letter) and the estimated deadline. If there are not enough projects to fill the 5 spaces, the matrix will still print the 5 spaces but without any information. Additionally, the project list per collaborator must be ordered by how close the estimated date is to the consulted date and the priority level. If there is any other type of error, a general error message will be shown. | | |
| **Outputs** | **Output Name** | **Data type** | **Format** |
| Success | String | A message stating that the community was registered successfully will be printed. |
| At least one project | String | A message stating that there should be at least on registered project to show the project information in matrix form. |
| Empty Date | String | A message stating that the entered query date doesn’t show any projects for any collaborator in the DIT with a registered project with posterior date will be shown. |
| Error | String | A message stating there was an error of unknown cause that didn't allow the function to work correctly will be printed. |

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| **Identifier and Name:** | Req#9: Access the detailed information of a project. | | |
| **Summary:** | After selecting the option to display project information based on a query date, the user can enter one of the IDs printed in the matrix to view detailed project information. Subsequently, it searches for the project using its ID; if not found, a "nonexistent project" message is printed. Then, the program will print the matrix of projects again for the user to double check which code they wanted to enter. Any errors like invalid or incomplete information prompt appropriate messages. If there are any other errors, a general error message is displayed. | | |
| **Inputs** | **Input name** | **Data Type** | **Conditions for valid values** |
| Project ID | String | * The user should enter the ID of a project that was shown from the project visualization matrix from REQ#8 * Mandatory |
| **Results or postcondition** | After the user has selected the option in Req#8 (display the information of projects in a matrix based on a query date) then the user must be able to enter one of the ID’s printed in the matrix to print all the information regarding that project. Next, it will look for the project using its ID, if not found, a “nonexistent project message is printed. The system will also reprint the matrix displayed before for the user to double check and enter again the ID they wanted. This loop will only stop until a project is displayed correctly. If there are any other errors like invalid info, the appropriate message will be shown. On the other hand, if there are any other errors, a general error message will pop up instead. | | |
| **Outputs** | **Output Name** | **Data type** | **Format** |
| Project information | String | A message containing all the information from the entered project will be printed. |
| Nonexistent project | String | A message stating that the entered ID doesn’t match with the ID of any of the preregistered projects will be printed. Then the matrix displayed before will be printed again for the user to reenter the project id. |
| Error | String | A message stating there was an error of unknown cause that didn't allow the function to work correctly will be printed. |
| Invalid information | String | A message stating that there are mistakes in the inputted information (don’t follow the conditions) |

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| **Identifier and Name:** | Req#10: Review the efficiency of a collaborator from the Department of Transformation and Improvement in a given month. | | |
| **Summary:** | First, an efficiency menu will be entered, and the user will need to press the option to review the efficiency of a collaborator in a given month. Before doing anything else, the general efficiency menu will check that there is at least one request, project and DTI collaborator registered, or else an “at least one” message will be printed. If the filter is passed, then, the system displays a menu with names of collaborators who have had at least one project assigned to them. Upon selecting a collaborator, the system then prompts the user to enter a month to a year so the efficiency in that month can be calculated. Afterwards, the system calculates and prints their efficiency using the formula stated in the postconditions box. If no projects are registered, it prompts an "at least one project" message. Similarly, if there are no DIT collaborators who haven't been assigned as leaders to any project, it prints an "at least one leader" message. | | |
| **Inputs** | **Input name** | **Data Type** | **Conditions for valid values** |
| Project leader | int | * The user must select an int that represents a collaborator from the DIT that was assigned at least one project. * Mandatory |
|  | Inquiry date | Calendar | * MM/yyyy * Mandatory |
| **Results or postcondition** | The system will print the efficiency of a collaborator from the DIT selected from the menu that displays names of the collaborators that had at least one project assigned to them. The efficiency of the collaborator is calculated using the following formula:  If there were no registered projects, an “at least one project” message will be printed. Likewise, if there were no DIT collaborators that weren’t assigned as leaders to any project, then an “at least one leader” message will be printed. | | |
| **Outputs** | **Output Name** | **Data type** | **Format** |
| Collaborator Efficiency | String | A message showing the collaborator efficiency of the selected DIT collaborator will be printed. |
| At least one project | String | A message stating that there should be at least on registered project will be printed. |
| At least one leader | String | A message showing that there must’ve been at least one collaborator as assigned leader will be printed. |
| Error | String | A message stating there was an error of unknown cause that didn't allow the function to work correctly will be printed. |
| Incomplete information | String | A message stating that not all the mandatory fields where filled will be printed. |
| Invalid information | String | A message stating that there are mistakes in the inputted information (don’t follow the conditions) |

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| **Identifier and Name:** | Req#11: Review the efficiency of a determined project | | |
| **Summary:** | First, an efficiency menu will be entered, and the user will need to press the option to review the efficiency of a project. The program lets the user evaluate the efficiency of a Transformation/Improvement project or a Knowledge Management project by selecting one from the displayed list of closed projects. It calculates efficiency using the formula shown in the postconditions. If there are no registered projects, it prints an “at least one project” message. Additionally, if there are no closed projects, it prints an “at least one closed project” message. For any other errors like incomplete or invalid information, or general errors, the program displays the appropriate message. | | |
| **Inputs** | **Input name** | **Data Type** | **Conditions for valid values** |
| Project | int | * The user must select one of the preregistered projects that have already been closed which will be displayed in an orderly menu. * Mandatory |
| **Results or postcondition** | The user will first enter this functionality by selecting the “project” option from the displayed list of general efficiency menu. The program will allow the user to review the efficiency of a Transformation/Improvement project by selecting one from the displayed list of closed projects and using the following formula:    If there is not at least registered project, an “at least one project” message will be printed. Furthermore, if there is not at least one closed project, a “at least one closed project” message will be printed. If there are any other errors like incomplete information, invalid information or any other general error, the appropriate message will be printed. | | |
| **Outputs** | **Output Name** | **Data type** | **Format** |
| Project Efficiency | String | A message showing the project efficiency of the selected project will be printed. |
| At least one project | String | A message stating that there should be at least on registered project will be printed. |
| At least one closed project | String | A message stating that there should be at least on registered closed project will be printed. |
| Error | String | A message stating there was an error of unknown cause that didn't allow the function to work correctly will be printed. |
| Incomplete information | String | A message stating that not all the mandatory fields where filled will be printed. |
| Invalid information | String | A message stating that there are mistakes in the inputted information (don’t follow the conditions) |

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| **Identifier and Name:** | Req#12: Review the efficiency of a request | | |
| **Summary:** | First, an efficiency menu will be entered, and the user will need to press the option to review the efficiency of a request. The system enables users to check the efficiency of a request by selecting one of the requests that has already been accepted or rejected. The efficiency is calculated using the formula stated in the postconditions. This will be possible if at least one request is registered and has had its status changed. If these conditions are not met, the appropriate message is displayed. If the entered information is incomplete, invalid, or any other general error occurs, the system prints the appropriate message. | | |
| **Inputs** | **Input name** | **Data Type** | **Conditions for valid values** |
| Request | int | * The user must select an option from the displayed list of requests which had their status changed to either rejected or accepted. * Mandatory |
| **Results or postcondition** | The user will first enter this functionality by selecting the “request” option from the displayed list of general efficiency menu. The system will allow the user to consult the efficiency of a request if there was at least one registered request and a request which status has been changed already. If neither of those conditions are met, the appropriate message will be printed. If the filters are passed, the user will be able to enter one of the displayed requests which had already been accepted or rejected to review the efficiency. The efficiency of a request is calculated using the following formular:  If the entered information was incomplete, invalid or any other general error happened in the process, the right message will be printed. | | |
| **Outputs** | **Output Name** | **Data type** | **Format** |
| Request Efficiency | String | A message showing the efficiency of the selected request will be printed. |
| At least one request | String | A message stating that there must be at least one preregistered request will be printed. |
| At least one accepted or rejected request | String | A message stating that there must be at least one accepted or rejected request will be printed. |
| Error | String | A message stating there was an error of unknown cause that didn't allow the function to work correctly will be printed. |
| Incomplete information | String | A message stating that not all the mandatory fields where filled will be printed. |
| Invalid information | String | A message stating that there are mistakes in the inputted information (don’t follow the conditions) |

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| **Identifier and Name:** | Req#13: Consult the number of projects by type and priority | | |
| **Summary:** | After selecting the option to consult the number of projects by type and priority through the general consultation menu then the system displays the number of registered Transformation/Improvement and Knowledge Management projects, categorized by project type and priority level. Since this method happens after the general consultation menu, if there are no registered DTI collaborators, projects, or requests, then a “one min of all the three types of entities” message will be displayed. For any other general errors, an appropriate message is displayed. | | |
| **Inputs** | **Input name** | **Data Type** | **Conditions for valid values** |
| N/A | N/A | * N/A |
| **Results or postcondition** | After selecting the option to consult the number of projects by type and priority from the consultation menu, then, the system will show the number of Transformation/Improvement and Knowledge Management projects that are registered at the moment. The information will be divided by the type of project and the four types of priority. Before entering any option freely, the general menu will check that there is at least one DTI collaborator, a project and a request registered before displaying any of the three options. If any other general error were to happen, a message will be shown in that case. | | |
| **Outputs** | **Output Name** | **Data type** | **Format** |
| Number of projects | String | A message showing the number of projects by type and priority levels will be printed. |
| General at least one leader, project, and request | String | A message stating that there must be at least a leader, a project, and a request to enter the specifics of the consultation menu, and therefore, consult the number of projects by type and priority. |
| Error | String | A message stating there was an error of unknown cause that didn't allow the function to work correctly will be printed. |

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| **Identifier and Name:** | Req#14: Consult the number of projects led by every collaborator in the Department of Transformation and Improvement. | | |
| **Summary:** | After selecting the option to consult the number of projects led by every DTI collaborator through the general consultation menu then the system lets users check the number of projects led by each DTI collaborator, showing their full name and ID alongside a counter. Since this method happens after the general consultation menu, if there are no registered DTI collaborators, projects, or requests, then a “one min of all the three types of entities” message will be displayed. For other errors, a general error message is shown. | | |
| **Inputs** | **Input name** | **Data Type** | **Conditions for valid values** |
| N/A | N/A | N/A |
| **Results or postcondition** | After entering this function from the general consultation menu, the system will allow the user to consult the number of projects led by every DTI collaborator. The message will contain the full name and ID of every collaborator with the counter by its side. Before displaying any of the three options (on which lets the user enters this functionality), the general consultation menu will check that there is at least one registered DTI collaborator, project, and request. If any of those entities is missing the general “at least one leader, project, and request” message will be printed. If there are any other errors a general error message will be shown. | | |
| **Outputs** | **Output Name** | **Data type** | **Format** |
| Number of led projects per collaborator | String | A message showing the number of projects led by every DTI team member will be printed. |
| General at least one leader, project, and request | String | A message stating that there must be at least a leader, a project, and a request to enter the specifics of the consultation menu, and therefore, consult the number of projects by type and priority. |
| Error | String | A message stating there was an error of unknown cause that didn't allow the function to work correctly will be printed. |

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| **Identifier and Name:** | Req#15: Consult the number of received requests and managed in a given month. | | |
| **Summary:** | After entering this function from the general consultation menu, the user can input a month to view the number of received and managed requests during that period. Before entering this functionality, the general consultation menu will make sure there is at least one DTI collaborator, one project and one request (showing the appropriate error message if one is missing). If the entered month is empty or doesn't follow the correct format, invalid message. For any other errors, a general error message is printed. | | |
| **Inputs** | **Input name** | **Data Type** | **Conditions for valid values** |
| Checked month | Calendar | * Mm-yyyy * Mandatory |
| **Results or postcondition** | The general consultation menu will first check that there is at least one registered project, DTI collaborator and request before displaying the options the user is allowed to choose (one being to consult the number of received and managed requests). If the project, collaborator, or request is missing, then an “at least one of each” message will be printed. After passing this filter and selecting the option in the menu “to consult the number of received and managed requests in a given month”, the user will be able to enter a month and a year to consult the number of received and managed request in that period. Afterwards, the system will check for the request and count the total number of requests that were received and count the ones that were managed (accepted or denied). If the entered month is not filled or the date doesn’t follow the format, invalid message will be shown. For any other error, a general error message will be printed. | | |
| **Outputs** | **Output Name** | **Data type** | **Format** |
| Number of received and managed requests | String | A message holding the information of how many requests were received and managed in the entered month will be shown. |
| General at least one leader, project, and request | String | A message stating that there must be at least a leader, a project, and a request to enter the specifics of the consultation menu, and therefore, consult the number of projects by type and priority. |
| Invalid date | String | A message stating that the entered date is either empty or it doesn’t use the required format is printed. |
| Error | String | A message stating there was an error of unknown cause that didn't allow the function to work correctly will be printed. |

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| **Identifier and Name:** | Req#16: Generate test objects | | |
| **Summary:** | When the program begins, it generates four basic DTI collaborators to test different processes and ensure the program works correctly. Each collaborator includes all their details, such as ID, full name, email, and extension, but they aren't part of any project. Afterwards, if the user selects the option from the general menu to generate test objects, departments, requests and projects will be created. If there's an error, it prints a generic error message. | | |
| **Inputs** | **Input name** | **Data Type** | **Conditions for valid values** |
| N/A | N/A | * N/A |
| **Results or postcondition** | When the program starts, the system will create 4 generic DTI collaborators to implement various types of processes afterwards to verify the functionalities of the program. Each collaborator will have all the information regarding each generic collaborator (including ID, full name, email, and extension) and will not be assigned to any project. Afterwards, if the user selects the option to “generate test objects” the program will create the following standard objects:   * 2 departments * 7 Requests * 7 Projects   All of these objects have been assigned generic and random information to fit the descriptions of the functions.If there is any error in the process, a generic error message will be printed instead. | | |
| **Outputs** | **Output Name** | **Data type** | **Format** |
| Successfully created the test objects | String | A message stating that the 4 DTI collaborators were created and registered successfully. |
| Error | String | A message stating there was an error of unknown cause that didn't allow the function to work correctly will be printed. |